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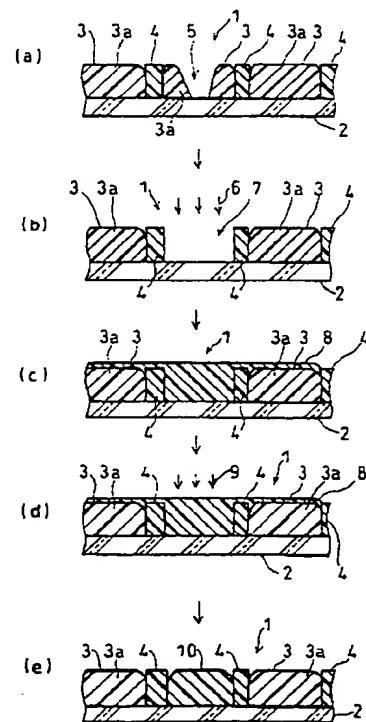
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(54) 【発明の名称】 カラーフィルタの欠陥修正方法および欠陥修正装置

(57) 【要約】

【課題】 欠陥部に所定の色度の着色層を形成するためのカラーフィルタの欠陥修正方法および欠陥修正装置を提供する。

【解決手段】 先ず、カラーフィルタ1の欠陥部5を含む画素部3に、画素部3と同じ形状に整形されたレーザ光6を照射し、欠陥部6を含む着色層3aが除去された除去部7を形成する。次に、除去部7およびその周辺部に上記着色層3aと同じ色相を有する感光性着色層8を設けた後、除去部7に画素部3と同じ形状に整形された紫外線9をカラーフィルタ1の表面側から照射し、除去部7の感光性着色層8のみを露光する。これにより、紫外線9の光量を感光性着色剤8に含有している着色剤を完全に架橋できる程度の十分なものとすることができます。修正画素10は所定の色度を有する。



## 【特許請求の範囲】

【請求項1】多数個並設された画素部を備えているカラーフィルタの前記画素部が有する着色層の欠陥を修正するカラーフィルタの欠陥修正方法において、前記画素部の形状に整形されたレーザ光により、着色層に欠陥部を含み修正を要する修正画素部の着色層を除去する工程と、着色層が除去された修正画素部を含む領域に、除去された着色層と同じ色相の感光性着色層を設ける工程と、前記修正画素部の感光性着色層に対して、画素部の形状に整形された露光用光線を感光性着色層の表面側から照射し、この感光性着色層を露光する工程と、露光することにより感光された感光性着色層を現像する工程と、この現像工程において感光されていない感光性着色層を洗い流す工程とを含むことを特徴とするカラーフィルタの欠陥修正方法。

【請求項2】前記感光性着色層は感光性着色剤をロールコータを用いて塗布することにより設けられることを特徴とする請求項1に記載のカラーフィルタの欠陥修正方法。

【請求項3】前記感光性着色層は感光性着色フィルムを貼り付けることにより設けられることを特徴とする請求項1に記載のカラーフィルタの欠陥修正方法。

【請求項4】多数個並設された画素部を備えているカラーフィルタの前記画素部が有する着色層の欠陥を修正するカラーフィルタの欠陥修正装置において、カラーフィルタが載置されるステージと、このステージ上のカラーフィルタを撮像し、着色層に欠陥部を含み修正を要する修正画素部を検出するための欠陥検出手段と、この欠陥検出手段を使用して検出された前記修正画素部の着色層を除去するためのレーザ光を出射するレーザ光出射手段と、

着色層が除去された修正画素部を含む領域に設けられた感光性着色層を露光するための露光用光線を出射する露光用光線出射手段と、

前記レーザ光出射手段から出射されたレーザ光および前記露光用光線出射手段から出射された露光用光線の形状を前記画素部の形状に整形する整形手段と、

この整形手段により整形された光線をカラーフィルタの前記修正画素部に収束させる光線収束手段とを備えていることを特徴とするカラーフィルタの欠陥修正装置。

【請求項5】前記欠陥検出手段はカラーフィルタの画像を拡大する拡大光学系部を備え、この拡大光学系部は前記光線収束手段を兼ねていることを特徴とする請求項4に記載のカラーフィルタの欠陥修正装置。

## 【発明の詳細な説明】

## 【0001】

プレイに設けられるカラーフィルタの欠陥を修正する欠陥修正方法および欠陥修正装置に関するものである。

## 【0002】

【従来の技術】フルカラーの液晶ディスプレイにはカラーフィルタが設けられる。このカラーフィルタは液晶ディスプレイの各画素に対応する画素部を有し、この画素部には着色層が設けられる。カラーフィルタにおいては、上記着色層の形成不良に起因する白抜けまたは混色等の欠陥を生じることがある。この欠陥は液晶ディスプレイの良好なフルカラー表示のために修正する必要がある。

【0003】上記欠陥を修正する従来の方法として、特開平3-274504号公報には図3に示すような欠陥修正方法が開示されている。この欠陥修正方法は、カラーフィルタ30の画素31に設けられている着色層31aの欠陥部32が図示しない検査装置により検出されると(図3(a))、上記画素31にレーザビーム33を照射して欠陥部32を含む着色層31aをブラックマトリクス35近傍まで除去して、除去部36とした後(図3(b))、この除去部36にのみ着色剤37を埋め込み、欠陥部32を修正するものである(図3(c))。

【0004】しかしながら、この欠陥修正方法では、以下のようない欠点がある。

(1) 除去部36にのみに着色剤37を埋め込む方法であるので、これを作業者の手作業で行う場合、除去部36が小さくなると熟練を要する。

(2) 上記埋め込みは、ディスペンサーまたは針を用いて行われるが、ディスペンサーの径や針先の径を0.1mm以下に設定することができない。また、着色剤37の特性が不均一になると、着色剤37の塗布量を制御できない。このため、除去部36が小さくなると、着色層の層厚を均一に形成することができない。

【0005】そこで、このような問題を解決するものとして特開平6-109919号公報には、図4に示すような欠陥修正方法が提案されている。この欠陥修正方法では、カラーフィルタ40の欠陥部41が図示しない検査装置により検出されると(図4(a))、先ず、この欠陥部41に図示しないYAG(Yttrium Aluminium Garnet)レーザからレーザビーム42を照射することにより、カラーフィルタ40における欠陥部41の領域を除去して、除去部43とする(図4(b))。次に、除去部43に図示しないディスペンサーを用いて着色剤を含有している紫外線硬化樹脂44を塗布する(図4(c))。

その後、ガラス基板45側、即ちカラーフィルタ40の裏面側から紫外線46を照射し、紫外線硬化樹脂44を硬化させる(図4(d))。続いて、余分な紫外線硬化樹脂44を洗浄して欠陥部41を修正する(図4(e))。

## 【0006】

6-109919号公報の欠陥修正方法は、以下のような問題点を有している。カラーフィルタ40には、感光剤としての紫外線吸収剤が添加されているが、この紫外線吸収剤は完全に紫外線46を吸収する訳ではない。このため、除去部43の紫外線硬化樹脂44に含有されている着色剤の架橋は不完全なものとなり、上記紫外線硬化樹脂44は所定の色度および膜厚を確保することができない。

【0007】本発明の目的は、欠陥部に所定の色度および層厚の着色層が形成されたカラーフィルタを得るためにのカラーフィルタの欠陥修正方法および欠陥修正装置を提供することにある。

【0008】

【課題を解決するための手段】上記の課題を解決するために、請求項1の発明のカラーフィルタの欠陥修正方法は、多数個並設された画素部を備えているカラーフィルタの上記画素部が有する着色層の欠陥を修正するカラーフィルタの欠陥修正方法において、上記画素部の形状に整形されたレーザ光により、着色層に欠陥部を含み修正を要する修正画素部の着色層を除去する工程と、着色層が除去された修正画素部を含む領域に、除去された着色層と同じ色相の感光性着色層を設ける工程と、上記修正画素部の感光性着色層に対して、画素部の形状に整形された露光用光線を感光性着色層の表面側から照射し、この感光性着色層を露光する工程と、露光することにより感光された感光性着色層を現像する工程と、この現像工程において感光されていない感光性着色層を洗い流す工程とを含むことを特徴としている。

【0009】上記方法によれば、修正画素部の欠陥部を含む着色層は、レーザ光によって画素部と同じ形状に除去される。そして、上記着色層が除去された修正画素部を含む領域に感光性着色層が設けられた後、感光性着色層を露光させるために感光性着色層の表面側から露光用光線が照射される。

【0010】この場合、上記露光用光線はレーザ光と同じ形状、即ち画素部と同じ形状に整形されているとともに、カラーフィルタの表面側から照射されているので、修正画素部の感光性着色層だけを的確に露光することができる。そして、露光が終了した後、感光性着色層を現像し、感光されていない感光性着色層を洗い流すと、修正画素部のみに新たな着色層が形成される。

【0011】本発明の方法では、上記のように、画素部と同じ形状に整形されたレーザ光により欠陥部を含む着色層を除去するので、この除去部は全て同じものとなる。

【0012】この結果、感光性着色層の層厚の設定が容易になり、形成作業の効率が向上する。

【0013】また、画素部と同じ形状に整形された露光用光線により、感光性着色層を表面側から露光するの

とができる。これにより、感光性着色層に含有されている着色剤の架橋を十分に行える程度の十分な光量の露光用光線を照射することができる。

【0014】この結果、着色層が除去された修正画素部には所定の色度を有した新たな着色層を適切に設けることができる。

【0015】請求項2の発明のカラーフィルタの欠陥修正方法は、請求項1に記載のカラーフィルタの欠陥修正方法において、上記感光性着色層が感光性着色剤をロールコータを用いて塗布することにより設けられることを特徴としている。

【0016】上記方法によれば、感光性着色剤をロールコータにより欠陥部を含む着色層が除去された箇所に塗布し、感光性着色層を設けることができる。

【0017】この結果、感光性着色層の形成作業には、針やディスペンサを用いる必要がなくなるので、上記箇所の形状、即ち上述した画素部が小さくなても、感光性着色層は所定の層厚を確保することができる。

【0018】請求項3の発明のカラーフィルタの欠陥修正方法は、請求項1に記載のカラーフィルタの欠陥修正方法において、上記感光性着色層は感光性着色フィルムを貼り付けることにより設けられることを特徴としている。

【0019】上記方法によれば、欠陥部を含む着色層が除去された箇所に感光性着色フィルムを貼り付けるだけで、感光性着色層を設けることができる。

【0020】この結果、感光性着色層の形成作業には、針やディスペンサを用いる必要がなくなるので、上記箇所の形状、即ち上述した画素部が小さくなても、感光性着色層は所定の層厚を確保することができるとともに、請求項2の欠陥修正方法では必要であった感光性着色剤の仮硬化が不要となるので、感光性着色層の形成作業の効率が請求項2の欠陥修正方法よりも向上する。

【0021】請求項4の発明のカラーフィルタの欠陥修正装置は、多数個並設された画素部を備えているカラーフィルタの上記画素部が有する着色層の欠陥を修正するカラーフィルタの欠陥修正装置において、カラーフィルタが載置されるステージと、このステージ上のカラーフィルタを撮像し、着色層に欠陥部を含み修正を要する修正画素部を検出するための欠陥検出手段と、この欠陥検出手段を使用して検出された上記修正画素部の着色層を除去するためのレーザ光を射出するレーザ光射出手段と、着色層が除去された修正画素部を含む領域に設けられた感光性着色層を露光するための露光用光線を射出する露光用光線射出手段と、上記レーザ光射出手段から射出されたレーザ光および上記露光用光線射出手段から射出された露光用光線の形状を上記画素部の形状に整形する整形手段と、この整形手段により整形された光線をカラーフィルタの上記修正画素部に収束させる光線収束手

【0022】上記構成によれば、例えばステージを移動させつつ、欠陥検出手段を使用してカラーフィルタの修正画素部の有無を調べる。修正画素部が検出されると、修正画素部の欠陥部を含む着色層に対してレーザ光出射手段からレーザ光が出射される。このレーザ光は、光線収束手段を経て、上記着色層に照射され、この着色層は画素部と同じ形状に除去される。

【0023】次に、着色層が除去された修正画素部を含む周辺部に感光性着色層が設けられると、露光用光線が露光用光線出射手段から出射される。露光用光線も整形手段を通過する際に、画素部と同じ形状に整形される。そして、露光用光線は光線収束手段により画素部と同じ形状になるように収束され、上記修正画素の感光性着色層に照射される。このため、着色層が除去された修正画素部の感光性着色層のみが露光される。

【0024】本発明の装置では、上記のように、整形手段によって画素部と同じ形状に整形されたレーザ光により、欠陥部を含む着色層を除去するので、この除去部の形状は全て同じものとなる。

【0025】この結果、感光性着色層の層厚の設定が容易になり、形成作業の効率が向上する。

【0026】また、レーザ光と同様に整形手段によって画素部と同じ形状に整形された露光用光線により、感光性着色層を表面側から露光するので、修正画素部の感光性着色層のみを的確に露光することができる。これにより、感光性着色層に含有されている着色剤の架橋を十分に行える程度の十分な光量の露光用光線を照射することができる。

【0027】この結果、着色層が除去された修正画素部には所定の色度を有した新たな着色層を適切に設けることができる。

【0028】請求項5の発明のカラーフィルタの欠陥修正装置は、請求項4に記載のカラーフィルタの欠陥修正装置において、上記欠陥検出手段はカラーフィルタの画像を拡大する拡大光学系部を備え、この拡大光学系部は上記光線収束手段を兼ねていることを特徴としている。

【0029】上記構成によれば、部品点数を削減することができるので、装置の製造コストを削減することができる。

【0030】

【発明の実施の形態】本発明の実施の形態を図1および図2に基づいて以下に説明する。尚、図1は、本発明のカラーフィルタの欠陥修正方法の概略を示す説明図であり、図2は、上記欠陥修正方法を用いて欠陥を修正する欠陥修正装置の概略構成を示す説明図である。

【0031】先ず、図1(a)に基づいてカラーフィルタの構成を説明する。カラーフィルタ1は、例えばガラス基板からなる透明基板2と、この透明基板2の一方の面に設けられる画素部3と、ブラックマトリクス4とを

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3と同じ形状になるように収束させるものである。一方、レーザ光6も紫外線透過型顕微鏡16により収束され、カラーフィルタ1上にスリット15aと同じ形状、即ち画素部3と同じ形状にて照射される。

【0037】また、紫外線透過型顕微鏡16の対物レンズ16aは、レーザ光7および紫外線9を所定の形状に集光し、決定するものである。形状を決定するためには、CCDカメラ23により観察して、対物レンズ16aのレンズ倍率とスリット15aを調整する。上記レンズには、観察用および加工用のものと、紫外線集光用のものとがある。前者のレンズには5倍、10倍、20倍、および50倍のものが使用され、後者のレンズには20倍および50倍のものが使用される。

【0038】ステージ18は、水平方向に移動自在に設けられており、その上面にカラーフィルタ1が載置される。また、ステージ18は紫外線透過型顕微鏡16の下方の筐体20上に取り付けられている。上記筐体20内には透過照明部19が設けられている。この透過照明部19はカラーフィルタ1を下から照射して、CCDカメラ23が上述した欠陥部5を検出し易いようにするものである。

【0039】上記構成において、ステージ18の下面側から透過照明部19がカラーフィルタ1を照射しつつ、ステージ18が水平方向に移動され、欠陥検出部14を使用してカラーフィルタ1における上記欠陥部5の有無を調べる。欠陥部5が検出されると(図1(a))、レーザ光出射部12からレーザ光6が射出される。このレーザ光6はハーフミラー部17を通過して、整形部15に達する。整形部15において、レーザ光6はスリット15aを通過すると、画素部3と同じ形状に整形される。そして、整形されたレーザ光6は紫外線透過型顕微鏡16を通過して、欠陥部5を含む画素部3に照射される。これにより、欠陥部5を含む着色層3aが除去され、除去部7が形成される(図1(b))。

【0040】上記のようにして、全ての欠陥部5を含む画素部3が除去されると、別の塗布装置において、図1(c)に示すように、感光性着色剤(富士エレクトロニクス製、あるいは日立成工業製)をカラーフィルタ1の除去部7およびその周辺部にロールコーティングにて塗布して、感光性着色層8を形成する。上記感光性着色剤は、除去した着色層3aと同じ色相を有しているものが使用される。また、除去部7の感光性着色層8は、紫外線9による減少分を考慮に入れて、現像後画素部3と同じ層厚になるように塗布される。そして、塗布作業が終了した後、感光性着色層8中の溶剤を揮発させ、感光性着色層8を仮硬化させるため、カラーフィルタ1が加熱される。

【0041】次に、感光性着色層8の塗布を終了したカラーフィルタ1は、ステージ18上に載置され、除去部7の感光性着色層8に対して紫外線9がカラーフィルタ

1の表面側から照射される(図1(d))。即ち、紫外線9は紫外線出射部13から出射され、ハーフミラー部17において反射されて整形部15に達する。そして、紫外線9は、スリット15aを通過する際に、スリット15aによりレーザ光6と同じ形状、即ち画素部3と同じ形状に整形される。紫外線9は紫外線収束部16にて収束されるため、除去部7の感光性着色層8には、画素部3と同じ形状に整形された紫外線9が照射される。

【0042】上記のようにして、全ての除去部7の感光性着色層8の露光が終了すると、カラーフィルタ1を現像液に浸漬し、露光することにより感光された感光性着色層8を現像する。その後、カラーフィルタ1を洗浄し、感光されていない感光性着色層8を除去する。これにより、除去部7には、先に除去した着色層3aと同じ色度の着色層を有する修正画素10が形成され(図1(e))、カラーフィルタ1の修正作業が完了する。

【0043】上記のよう、本発明の欠陥修正方法では、欠陥部5を含む着色層3aの除去が、スリット15aにより画素部3と同じ形状に整形されたレーザ光6により行われているので、除去部7の形状が全て同じものとなる。これにより、感光性着色層8の膜厚の設定が容易になり、塗布作業の効率が向上する。

【0044】また、感光性着色層8を形成するために使用される感光性着色剤はロールコーティングにより塗布することができるので、除去部7の形状、即ち画素部3が小さくなっても、上記修正画素10は所定の層厚を確保することができる。

【0045】さらに、除去部7の感光性着色層8の露光は、スリット15aにより画素部3と同じ形状に整形された紫外線9をカラーフィルタ1の表面側から照射することにより行われているので、上記紫外線9を除去部7の感光性着色層8のみに的確に照射することができる。従って、紫外線9は、除去部7の感光性着色層8に含有されている着色剤の架橋を完全なものとする程度の十分な光量とすることができますので、修正画素10は除去した着色層3aと同じ色度を有するものとなる。

【0046】そして、対物レンズ16aは、カラーフィルタ1の画像を拡大するための欠陥検出部14の光学系を兼ねているので、部品点数を削減することができ、装置のコストダウンを図ることができる。

【0047】また、感光性着色剤を感光性着色フィルムに置き換えて感光性着色層8としてもよい。この場合、除去された着色層3aと同じ色相を有した感光性着色フィルムは、均一に加熱されたローラにより除去部7およびその周辺に熱圧着される。そして、上記感光性着色フィルムは画素部3と同じ形状に整形された紫外線9によりカラーフィルタ1の表面側から露光される。続いて、上述した現像および洗浄をカラーフィルタ1に施すと、除去した着色層3aと同じ色度を有する修正画素10が形成され、カラーフィルタ1の修正作業が完了する。

## 【0048】

【発明の効果】以上のように、請求項1の発明のカラーフィルタの欠陥修正方法は、多数個並設された画素部を備えているカラーフィルタの上記画素部が有する着色層の欠陥を修正するカラーフィルタの欠陥修正方法において、上記画素部の形状に整形されたレーザ光により、着色層に欠陥部を含み修正を要する修正画素部の着色層を除去する工程と、着色層が除去された修正画素部を含む領域に、除去された着色層と同じ色相の感光性着色層を設ける工程と、上記修正画素部の感光性着色層に対し、画素部の形状に整形された露光用光線を感光性着色層の表面側から照射し、この感光性着色層を露光する工程と、露光することにより感光された感光性着色層を現像する工程と、この現像工程において感光されていない感光性着色層を洗い流す工程とを含むことを特徴としている。

【0049】これにより、欠陥部を含む着色層が除去された箇所の形状は全て同じものとなり、感光性着色層の層厚の設定が容易になり、形成作業の効率が向上するという効果を奏する。また、上記着色層が除去された修正画素部の感光性着色層のみを的確に露光することができ、十分な露光用光線を上記修正画素部に照射することができるので、上記修正画素部には所定の色度を有した新たな着色層を設けることができるという効果を併せて奏する。

【0050】請求項2の発明のカラーフィルタの欠陥修正方法は、請求項1に記載のカラーフィルタの欠陥修正方法において、上記感光性着色層が感光性着色剤を塗布することにより設けられていることを特徴としている。

【0051】これにより、感光性着色層の塗布作業には、針やディスペンサを用いる必要がなくなるので、上記箇所の形状、即ち画素部が小さくなっても、感光性着色層は所定の層厚を確保することができるという効果を奏する。

【0052】請求項3の発明のカラーフィルタの欠陥修正方法は、請求項1に記載のカラーフィルタの欠陥修正方法において、上記感光性着色層が感光性着色フィルムを貼り付けることにより設けられていることを特徴としている。

【0053】これにより、感光性着色層の形成作業には、針やディスペンサを用いる必要がなくなるので、上記箇所の形状、即ち上述した画素部が小さくなつても、感光性着色層は所定の層厚を確保することができるとともに、請求項2の欠陥修正方法では必要であった感光性着色剤の仮硬化が不要となるので、感光性着色層の形成作業の効率が請求項2の欠陥修正方法よりも向上するという効果を奏する。

【0054】請求項4の発明のカラーフィルタの欠陥修正装置は、多数個並設された画素部を備えているカラーフィルタの欠陥修正装置において、カラーフィルタが載置されるステージと、このステージ上のカラーフィルタを撮像し、着色層に欠陥部を含み修正を要する修正画素部を検出するための欠陥検出手段と、この欠陥検出手段を使用して検出された上記修正画素部の着色層を除去するためのレーザ光を出射するレーザ光出射手段と、着色層が除去された修正画素部を含む領域に設けられた感光性着色層を露光するための露光用光線を出射する露光用光線出射手段と、上記レーザ光出射手段から出射されたレーザ光および上記露光用光線出射手段から出射された露光用光線の形状を上記画素部の形状に整形する整形手段と、この整形手段により整形された光線をカラーフィルタの上記修正画素部に収束させる光線収束手段とを備えている構成である。

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【0055】これにより、整形手段により画素部と同じ形状に整形されたレーザ光および露光用光線とが、それぞれ修正画素部の欠陥部を含む着色層および修正画素部の感光性着色層に照射されるので、着色層を除去した箇所の形状が全て同一になるとともに、上記感光性着色層だけを露光することができる。従って、感光性着色層の層厚の設定が容易になり、形成作業の効率が向上するとともに、感光性着色層に含有されている着色剤の架橋を十分に行える程度の十分な光量の露光用光線を照射することができるという効果を奏する。

【0056】請求項5の発明のカラーフィルタの欠陥修正装置は、請求項4に記載のカラーフィルタの欠陥修正装置において、上記欠陥修正手段はカラーフィルタの画像を拡大する拡大光学系部を備え、この拡大光学系部は上記光線収束手段を兼ねている構成である。

【0057】これにより、部品点数を削減することができるので、装置の製造コストを削減することができるという効果を奏する。

## 【図面の簡単な説明】

【図1】本発明のカラーフィルタの欠陥修正方法の概略を示す断面図である。

【図2】図1に示した方法を実施するための欠陥修正装置の概略構成を示す説明図である。

【図3】従来のカラーフィルタの欠陥修正方法の概略を示す断面図である。

【図4】従来の他のカラーフィルタの欠陥修正方法の概略を示す断面図である。

## 【符号の説明】

- 1 カラーフィルタ
- 3 画素部
- 3 a 着色層
- 5 欠陥部
- 6 レーザ光
- 8 感光性着色層
- 9 紫外線（露光用光線）

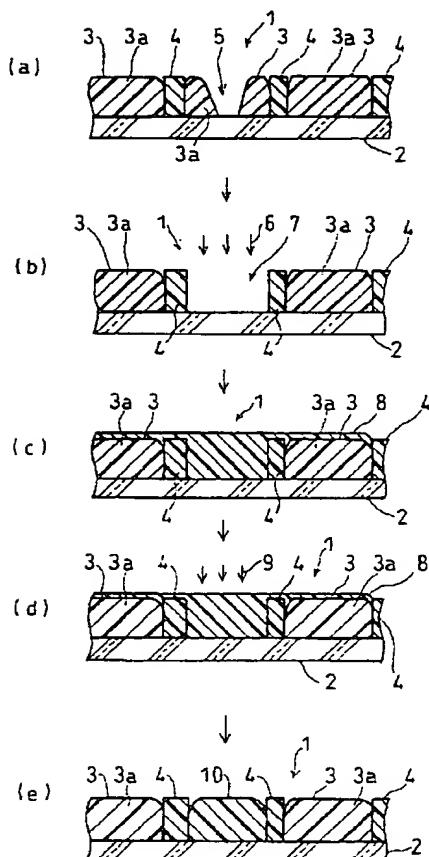
11

1 3 紫外線光源（露光用光線出射手段）  
 1 4 欠陥検出部（欠陥検出手段）  
 1 5 整形部（整形手段）

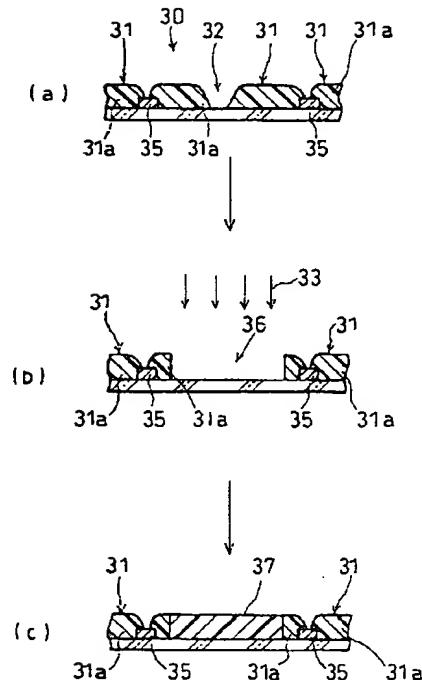
12

1 6 紫外線透過型顕微鏡（紫外線収束手段、拡大光学系部）  
 1 8 ステージ

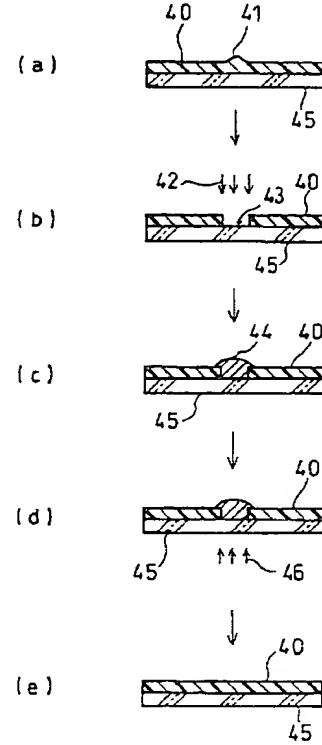
【図1】



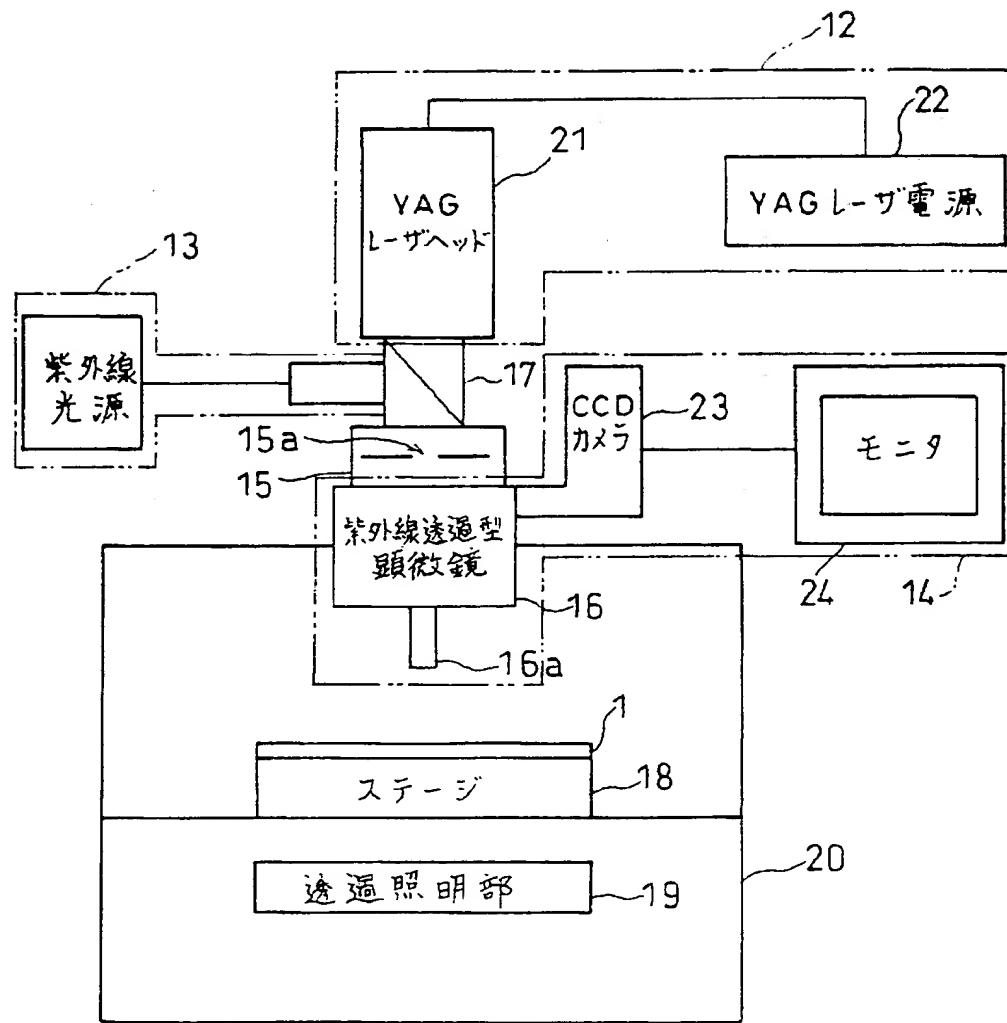
【図3】



【図4】



[図2]



フロントページの続き

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[JP,09-184910,A]

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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the defective correction technique and defective correction equipment which correct the defect of a light filter prepared in a liquid crystal color display.

[0002]

[Description of the Prior Art] A light filter is prepared in a full color liquid crystal display. This light filter has the pixel section corresponding to each pixel of a liquid crystal display, and a tinction layer is prepared in this pixel section. In a light filter, defects, such as a white omission resulting from poor formation of the above-mentioned tinction layer or color mixture, may be produced. It is necessary to correct this defect for the full color display with a good liquid crystal display.

[0003] As the conventional technique of correcting the above-mentioned defect, the defective correction technique which is shown in drawing 3 is indicated by JP,3-274504,A. If this defective correction technique is detected by the test stand which the defective part 32 of tinction layer 31a prepared in the pixel 31 of a light filter 30 does not illustrate ( drawing 3 (a) ) After removing tinction layer 31a which irradiates the laser beam 33 and contains a defective part 32 in the above-mentioned pixel 31 to about 35 black matrix and considering as the elimination section 36 ( drawing 3 (b) ), a coloring agent 37 is embedded only among this elimination section 36, and a defective part 32 is corrected ( drawing 3 (c) ).

[0004] However, there are the following faults by this defective correction technique.

(1) Since it is the technique of embedding a coloring agent 37 only among the elimination section 36, when performing this by an operator's handicraft, skill will be required if the elimination section 36 becomes small.

(2) Although the above-mentioned embedding is performed using a wire dispenser or a needle, they can set neither the path of a wire dispenser, nor the path of the needle point as 0.1mm or less. Moreover, if the property of a coloring agent 37 becomes uneven, the coverage of a coloring agent 37 is uncontrollable. For this reason, if the elimination section 36 becomes small, the thickness of a tinction layer cannot be formed uniformly.

[0005] Then, the defective correction technique which is shown in drawing 4 is proposed by JP,6-109919,A as what solves such a problem. By this defective correction technique, if detected by the test stand which the defective part 41 of a light filter 40 does not illustrate ( drawing 4 (a) ), by irradiating the laser beam 42 first from YAG (Yttrium Aluminium Garnet) laser which is not illustrated to this defective part 41, the area of the defective part 41 in a light filter 40 will be removed, and it will consider as the elimination section 43 ( drawing 4 (b) ). Next, the ultraviolet-rays hardening resin 44 which contains the coloring agent using the dispenser which is not illustrated among the elimination section 43 is applied ( drawing 4 (c) ). Then, ultraviolet rays 46 are irradiated from a glass-substrate 45, i.e., rear face of light filter 40, side, and the ultraviolet-rays hardening resin 44 is stiffened ( drawing 4 (d) ). Then, the excessive ultraviolet-rays hardening resin 44 is washed, and a defective part 41 is

corrected ( drawing 4 (e) ).

[0006]

[Problem(s) to be Solved by the Invention] However, the defective correction technique of above-mentioned JP,6-109919,A has the following troubles. Although the ultraviolet absorber as a sensitization agent is added by the light filter 40, to it, this ultraviolet absorber does not necessarily absorb ultraviolet rays 46 completely. For this reason, bridge formation of the coloring agent contained to the ultraviolet-rays hardening resin 44 of the elimination section 43 will not be able to become imperfect, and the above-mentioned ultraviolet-rays hardening resin 44 cannot secure a predetermined chromaticity and a predetermined thickness.

[0007] The purpose of this invention is to offer the defective correction technique and defective correction equipment of a light filter for obtaining the light filter by which the predetermined chromaticity and the tinction layer of a thickness were formed in the defective part.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the defective correction technique of the light filter invention of a claim 1 In the defective correction technique of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The process which removes the tinction layer of the correction pixel section which a tinction layer takes correction including a defective part by the laser beam orthopedically operated by the configuration of the above-mentioned pixel section, The process which prepares the removed tinction layer and the photosensitive tinction layer of the same hue in the area containing the correction pixel section from which the tinction layer was removed, The process which irradiates the beam of light for exposure orthopedically operated by the configuration of the pixel section from the front-face side of a photosensitive tinction layer to the photosensitive tinction layer of the above-mentioned correction pixel section, and exposes this photosensitive tinction layer, It is characterized by including the process which develops the exposed photosensitive tinction layer, and the process which flushes the photosensitive tinction layer which has not been exposed in this development process by exposing.

[0009] According to the above-mentioned technique, the tinction layer containing the defective part of the correction pixel section is removed by the laser beam at the same configuration as the pixel section. And after preparing a photosensitive tinction layer in the area containing the correction pixel section from which the above-mentioned tinction layer was removed, in order to make a photosensitive tinction layer expose, the beam of light for exposure is irradiated from the front-face side of a photosensitive tinction layer.

[0010] In this case, since the above-mentioned beam of light for exposure is irradiated from the front-face side of a light filter while it is orthopedically operated by the same configuration as a laser beam, i.e., the same configuration as the pixel section, it can expose only the photosensitive tinction layer of the correction pixel section exactly. And after completing exposure, a photosensitive tinction layer is developed, and if the photosensitive tinction layer which has not been exposed is flushed, a new tinction layer will be formed only in the correction pixel section.

[0011] By the technique of this invention, since the tinction layer which contains a defective part by the laser beam orthopedically operated as mentioned above by the same configuration as the pixel section is removed, the whole of this elimination section will become the same.

[0012] Consequently, a setup of the thickness of a photosensitive tinction layer becomes easy, and the luminous efficacy of formation work improves.

[0013] Moreover, with the beam of light for exposure orthopedically operated by the same configuration as the pixel section, since a photosensitive tinction layer is exposed from a front-face side, only the photosensitive tinction layer of the correction pixel section can be exposed exactly. The beam of light for exposure of sufficient quantity of light of the grade which can fully construct a bridge in the coloring agent contained in the photosensitive tinction layer by this can be irradiated.

[0014] Consequently, the new tinction layer with the predetermined chromaticity can be pertinently

prepared in the correction pixel section from which the tinction layer was removed.

[0015] It is characterized by establishing the defective correction technique of the light filter invention of a claim 2 in the defective correction technique of a light filter according to claim 1, when the above-mentioned photosensitive tinction layer applies a photosensitive coloring agent using a roll coater.

[0016] According to the above-mentioned technique, a photosensitive coloring agent can be applied to the part where the tinction layer which contains a defective part by the roll coater was removed, and a photosensitive tinction layer can be prepared.

[0017] Consequently, since it becomes unnecessary to use a needle and a dispenser, even if it becomes small, the configuration, i.e., the pixel section mentioned above, of the above-mentioned part, a photosensitive tinction layer can secure a predetermined thickness to formation work of a photosensitive tinction layer.

[0018] The defective correction technique of the light filter invention of a claim 3 is characterized by being prepared when the above-mentioned photosensitive tinction layer sticks a photosensitive tinction film in the defective correction technique of a light filter according to claim 1.

[0019] According to the above-mentioned technique, a photosensitive tinction layer can be prepared only by sticking a photosensitive tinction film on the part where the tinction layer containing a defective part was removed.

[0020] Consequently, for formation work of a photosensitive tinction layer, since it becomes unnecessary to use a needle and a dispenser, even if it becomes small, the configuration, i.e., the pixel section mentioned above, of the above-mentioned part, since temporary hardening of the required photosensitive coloring agent becomes unnecessary, by the defective correction technique of a claim 2, its luminous efficacy of formation work of a photosensitive tinction layer improves rather than the defective correction technique of a claim 2, while a photosensitive tinction layer can secure a predetermined thickness.

[0021] The defective correction equipment of the light filter of invention of a claim 4 In the defective correction equipment of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The defective detection means for detecting the correction pixel section which picturizes the light filter on the stage in which a light filter is laid, and this stage, and a tinction layer takes correction including a defective part, The laser-beam outgoing-radiation means which carries out the outgoing radiation of the laser beam for removing the tinction layer of the above-mentioned correction pixel section detected using this defective detection means, The beam-of-light outgoing-radiation means for exposure which carries out the outgoing radiation of the beam of light for exposure for exposing the photosensitive tinction layer prepared in the area containing the correction pixel section from which the tinction layer was removed, A plastic surgery means to operate orthopedically the configuration of the beam of light for exposure by which the outgoing radiation was carried out from the laser beam and the above-mentioned beam-of-light outgoing-radiation means for exposure by which the outgoing radiation was carried out from the above-mentioned laser-beam outgoing-radiation means in the configuration of the above-mentioned pixel section, It is characterized by having a beam-of-light convergence means to complete the beam of light orthopedically operated by this plastic surgery means as the above-mentioned correction pixel section of a light filter.

[0022] According to the above-mentioned configuration, the existence of the correction pixel section of a light filter is investigated using a defective detection means, moving a stage, for example. A detection of the correction pixel section carries out the outgoing radiation of the laser beam from a laser-beam outgoing-radiation means to the tinction layer containing the defective part of the correction pixel section. This laser beam passes through a beam-of-light convergence means, the above-mentioned tinction layer irradiates, and this tinction layer is removed by the same configuration as the pixel section.

[0023] Next, if a photosensitive tinction layer is prepared in the circumference section containing the correction pixel section from which the tinction layer was removed, the outgoing radiation of the beam

of light for exposure will be carried out from the beam-of-light outgoing-radiation means for exposure. In case the beam of light for exposure also passes a plastic surgery means, it is orthopedically operated by the same configuration as the pixel section. And it converges so that it may become the same configuration as the pixel section by the beam-of-light convergence means, and the beam of light for exposure is irradiated by the photosensitive tinction layer of the above-mentioned correction pixel. For this reason, only the photosensitive tinction layer of the correction pixel section from which the tinction layer was removed is exposed.

[0024] With the equipment of this invention, as mentioned above, by the laser beam orthopedically operated by the plastic surgery means by the same configuration as the pixel section, since the tinction layer containing a defective part is removed, all the configurations of this elimination section will become the same.

[0025] Consequently, a setup of the thickness of a photosensitive tinction layer becomes easy, and the luminous efficacy of formation work improves.

[0026] Moreover, with the beam of light for exposure orthopedically operated by the plastic surgery means like the laser beam by the same configuration as the pixel section, since a photosensitive tinction layer is exposed from a front-face side, only the photosensitive tinction layer of the correction pixel section can be exposed exactly. The beam of light for exposure of sufficient quantity of light of the grade which can fully construct a bridge in the coloring agent contained in the photosensitive tinction layer by this can be irradiated.

[0027] Consequently, the new tinction layer with the predetermined chromaticity can be pertinently prepared in the correction pixel section from which the tinction layer was removed.

[0028] The defective correction equipment of the light filter of invention of a claim 5 is equipped with the expansion optical-system section to which the above-mentioned defective detection means expands the picture image of a light filter in the defective correction equipment of a light filter according to claim 4, and this expansion optical-system section is characterized by serving as the above-mentioned beam-of-light convergence means.

[0029] According to the above-mentioned configuration, since parts mark are reducible, the manufacturing cost of equipment is reducible.

[0030]

[Embodiments of the Invention] The gestalt of implementation of this invention is explained below based on the drawing 1 and the drawing 2. In addition, drawing 1 is explanatory drawing showing the outline of the defective correction technique of the light filter of this invention, and drawing 2 is explanatory drawing showing the outline configuration of the defective correction equipment which corrects a defect using the above-mentioned defective correction technique.

[0031] First, the configuration of a light filter is explained based on drawing 1 (a). The light filter 1 is equipped with the transparent substrate 2 which consists of a glass substrate, the pixel section 3 prepared in one field of this transparent substrate 2, and the black matrix 4.

[0032] The pixel section 3 corresponds to each pixel of a liquid crystal cell, and, as for each pixel section 3, the area is divided by the black matrix 4. The pixel section 3 has tinction layer 3a which consists of the acrylic system resin or polyester system resin containing the red who is a color element, green, the color which has one predetermined color of blue, or the pigment. Moreover, the black matrix 4 consists only of a resin containing the black coloring agent, or consists of metal layers, such as Cr, aluminum, and Cu. And the defective parts 5, such as a white omission or color mixture, should arise among the pixel section 3 of such a light filter 1.

[0033] Next, the configuration of the above-mentioned defective correction equipment is explained based on drawing 2. This defective correction equipment consists of the laser-beam outgoing-radiation section 12 as a laser-beam outgoing-radiation means, the ultraviolet line light source 13 as a beam-of-light outgoing-radiation means for exposure, the defective detecting element 14 as a defective detection means, the plastic surgery section 15 as a plastic surgery means, a beam-of-light convergence means and the ultraviolet-rays transparency type microscope 16 as expansion optical-system section, the one-

way mirror section 17, a stage 18, the transmitted illumination section 19, and a case 20.

[0034] The laser-beam outgoing-radiation section 12 carries out the outgoing radiation of the laser beam 6 shown in the drawing 1 (b) whose wavelength is 355nm or 532nm, and is equipped with the YAG (Yttrium Aluminium Garnet) laser head 21 and the YAG laser power 22. It connects with the YAG laser power 22 and the one-way mirror section 17, and the YAG laser head 21 generates a laser beam 6, and is irradiated towards a stage 18. In addition, the path of the above-mentioned laser beam 6 is larger than the path of slit 15a mentioned later. Moreover, a laser beam 6 can remove more deeply tinction layer 3a mentioned above so that wavelength is long. Therefore, in the laser-beam outgoing-radiation section 12, the elimination depth of the above-mentioned tinction layer 3a can be adjusted by switching wavelength. The ultraviolet line light source 13 turns to a stage 18 the ultraviolet rays 9 as a beam of light for exposure shown in drawing 1 (d), and carries out an outgoing radiation. The defective detecting element 14 is for detecting the defective part 5 shown in the drawing 1 of a light filter 1 (a) laid on the stage 18. The defective detecting element 14 is equipped with the ultraviolet-rays transparency type microscope 16, CCD camera 23 which picturizes the above-mentioned light filter 1, and the monitor 24 which projects the picturized picture. CCD camera 23 is attached in the ultraviolet-rays transparency type microscope 16.

[0035] The plastic surgery section 15 is attached between the one-way mirror section 17 and the ultraviolet-rays transparency type microscope 16, and operates orthopedically in the same configuration as the pixel section 3 which showed the laser beam 6 and the ultraviolet rays 9 in drawing 1 (a) by slit 15a. And slit 15a which the laser beam 6 and the ultraviolet rays 9 pass has a rectangle according to the configuration of the pixel section 3, and can change the size of opening according to the size of the pixel section 3.

[0036] The ultraviolet-rays transparency type microscope 16 is formed in the lower part of the plastic surgery section 15, slit 15a is adjusted, and the configuration of the ultraviolet rays 9 irradiated on a light filter 1 is completed so that it may become the same configuration as the pixel section 3. On the other hand, it converges under the ultraviolet-rays transparency type microscope 16, and a laser beam 6 is also irradiated in the same configuration as slit 15a, i.e., the same configuration as the pixel section 3, on a light filter 1.

[0037] Moreover, objective lens 16a of the ultraviolet-rays transparency type microscope 16 condenses and determines the laser beam 7 and the ultraviolet rays 9 as a predetermined configuration. In order to determine a configuration, it observes by CCD camera 23 and the lens scale factor of objective lens 16a and slit 15a are adjusted. There are an object for observation and a thing for a manipulation, and a thing for ultraviolet-rays condensing in the above-mentioned lens. A 50 times [ 5 times, 10 times, 20 times, and ] as many thing as this is used for the former lens, and a 50 times [ 20 times and ] as many thing as this is used for the latter lens.

[0038] The stage 18 is formed horizontally free [ a move ] and a light filter 1 is laid in the top. Moreover, the stage 18 is attached on the case 20 of the lower part of the ultraviolet-rays transparency type microscope 16. The transmitted illumination section 19 is formed in the above-mentioned case 20. This transmitted illumination section 19 irradiates a light filter 1 from the bottom, and tends to detect the defective part 5 which CCD camera 23 mentioned above.

[0039] In the above-mentioned configuration, the transmitted illumination section 19 irradiating a light filter 1 from the inferior-surface-of-tongue side of a stage 18, a stage 18 is moved horizontally and the existence of the above-mentioned defective part 5 in a light filter 1 is investigated using the defective detecting element 14. A detection of a defective part 5 carries out the outgoing radiation of the laser beam 6 from the laser-beam outgoing-radiation section 12 ( drawing 1 (a)). This laser beam 6 passes the one-way mirror section 17, and reaches the plastic surgery section 15. In the plastic surgery section 15, a laser beam 6 will be orthopedically operated by the same configuration as the pixel section 3, if slit 15a is passed. And the laser beam 6 operated orthopedically passes the ultraviolet-rays transparency type microscope 16, and is irradiated by the pixel section 3 containing a defective part 5. Tinction layer 3a containing a defective part 5 is removed by this, and the elimination section 7 is formed ( drawing 1

(b)).

[0040] In another coater, if the pixel section 3 which contains all the defective parts 5 as mentioned above is removed, as shown in drawing 1 (c), a photosensitive coloring agent (the product made from the Fuji electronics or Hitachi Chemical make) will be applied to the elimination section 7 and its circumference section of a light filter 1 in a roll coater, and the photosensitive tinction layer 8 will be formed. What has the hue as removed tinction layer 3a with the same above-mentioned photosensitive coloring agent is used. Moreover, taking the decrement by ultraviolet rays 9 into consideration, the photosensitive tinction layer 8 of the elimination section 7 is applied so that it may become the same thickness as the pixel section after development 3. And after completing application work, in order to volatilize the solvent in the photosensitive tinction layer 8 and to carry out temporary hardening of the photosensitive tinction layer 8, a light filter 1 is heated.

[0041] Next, the light filter 1 which ended the application of the photosensitive tinction layer 8 is laid on a stage 18, and ultraviolet rays 9 are irradiated from the front-face side of a light filter 1 to the photosensitive tinction layer 8 of the elimination section 7 (drawing 1 (d)). That is, from the ultraviolet-rays outgoing-radiation section 13, an outgoing radiation is carried out, it is reflected in the one-way mirror section 17, and ultraviolet rays 9 reach the plastic surgery section 15. And in case ultraviolet rays 9 pass slit 15a, they are orthopedically operated by the same configuration as a laser beam 6, i.e., the same configuration as the pixel section 3, by slit 15a. Since it converges ultraviolet rays 9 in the ultraviolet-rays convergence section 16, the ultraviolet rays 9 orthopedically operated by the same configuration as the pixel section 3 are irradiated by the photosensitive tinction layer 8 of the elimination section 7.

[0042] After exposure of the photosensitive tinction layer 8 of all the elimination sections 7 is completed as mentioned above, the photosensitive tinction layer 8 exposed by being immersed in a developer and exposing a light filter 1 is developed. Then, a light filter 1 is washed and the photosensitive tinction layer 8 which has not been exposed is removed. Thereby, the correction pixel 10 which has the tinction layer of the same chromaticity as tinction layer 3a removed previously is formed in the elimination section 7 (drawing 1 (e)), and correction work of a light filter 1 is completed among it.

[0043] As mentioned above, by the defective correction technique of this invention, since elimination of tinction layer 3a containing a defective part 5 is performed by the laser beam 6 orthopedically operated by slit 15a by the same configuration as the pixel section 3, all the configurations of the elimination section 7 will become the same. Thereby, a setup of the thickness of the photosensitive tinction layer 8 becomes easy, and the luminous efficacy of application work improves.

[0044] Moreover, in the photosensitive coloring agent used in order to form the photosensitive tinction layer 8, since it can apply by the roll coater, even if the configuration 3 of the elimination section 7, i.e., the pixel section, becomes small, the above-mentioned correction pixel 10 can secure a predetermined thickness.

[0045] Furthermore, since exposure of the photosensitive tinction layer 8 of the elimination section 7 is performed by irradiating the ultraviolet rays 9 orthopedically operated by slit 15a by the same configuration as the pixel section 3 from the front-face side of a light filter 1, the above-mentioned ultraviolet rays 9 can be irradiated exactly only at the photosensitive tinction layer 8 of the elimination section 7. Therefore, since ultraviolet rays 9 can be made into sufficient quantity of light of the grade which makes perfect bridge formation of the coloring agent contained in the photosensitive tinction layer 8 of the elimination section 7, the correction pixel 10 has the same chromaticity as removed tinction layer 3a.

[0046] And since objective lens 16a serves as the optical system of the defective detecting element 14 for expanding the picture image of a light filter 1, it can cut down parts mark and can aim at a cost cut of equipment.

[0047] Moreover, a photosensitive coloring agent is transposed to a photosensitive tinction film, and it is good also as a photosensitive tinction layer 8. In this case, thermocompression bonding of the

photosensitive tinction film with the same hue as removed tinction layer 3a is carried out on the elimination section 7 and the outskirts of its with the roller heated uniformly. And the above-mentioned photosensitive tinction film is exposed from the front-face side of a light filter 1 by the ultraviolet rays 9 orthopedically operated by the same configuration as the pixel section 3. Then, if the development and washing which were mentioned above are performed to a light filter 1, the correction pixel 10 which has the same chromaticity as removed tinction layer 3a will be formed, and correction work of a light filter 1 will be completed.

[0048]

[Effect of the Invention] As mentioned above, the defective correction technique of the light filter invention of a claim 1 In the defective correction technique of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The process which removes the tinction layer of the correction pixel section which a tinction layer takes correction including a defective part by the laser beam orthopedically operated by the configuration of the above-mentioned pixel section, The process which prepares the removed tinction layer and the photosensitive tinction layer of the same hue in the area containing the correction pixel section from which the tinction layer was removed, The process which irradiates the beam of light for exposure orthopedically operated by the configuration of the pixel section from the front-face side of a photosensitive tinction layer to the photosensitive tinction layer of the above-mentioned correction pixel section, and exposes this photosensitive tinction layer, It is characterized by including the process which develops the exposed photosensitive tinction layer, and the process which flushes the photosensitive tinction layer which has not been exposed in this development process by exposing.

[0049] It will become the same, a setup of the thickness of a photosensitive tinction layer becomes easy, and all the configurations of a part where the tinction layer containing a defective part was removed by this do so the effect that the luminous efficacy of formation work improves. Moreover, since only the photosensitive tinction layer of the correction pixel section from which the above-mentioned tinction layer was removed can be exposed exactly and sufficient beam of light for exposure can be irradiated at the above-mentioned correction pixel section, the effect that the new tinction layer with the predetermined chromaticity can be prepared in the above-mentioned correction pixel section is collectively done so.

[0050] It is characterized by establishing the defective correction technique of the light filter invention of a claim 2 in the defective correction technique of a light filter according to claim 1, when the above-mentioned photosensitive tinction layer applies a photosensitive coloring agent.

[0051] Thereby, for application work of a photosensitive tinction layer, since it becomes unnecessary to use a needle and a dispenser, even if it becomes small, the configuration, i.e., the pixel section, of the above-mentioned part, a photosensitive tinction layer does so the effect that a predetermined thickness is securable.

[0052] It is characterized by establishing the defective correction technique of the light filter invention of a claim 3 in the defective correction technique of a light filter according to claim 1, when the above-mentioned photosensitive tinction layer sticks a photosensitive tinction film.

[0053] By this, since it becomes unnecessary to use a needle and a dispenser for formation work of a photosensitive tinction layer Even if it becomes small, the configuration, i.e., the pixel section mentioned above, of the above-mentioned part, while a photosensitive tinction layer can secure a predetermined thickness By the defective correction technique of a claim 2, since temporary hardening of the required photosensitive coloring agent becomes unnecessary, the effect that the luminous efficacy of formation work of a photosensitive tinction layer improves rather than the defective correction technique of a claim 2 is done so.

[0054] The defective correction equipment of the light filter of invention of a claim 4 In the defective correction equipment of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The defective detection means for detecting the correction pixel section which picturizes the light filter on the stage in

which a light filter is laid, and this stage, and a tinction layer takes correction including a defective part, The laser-beam outgoing-radiation means which carries out the outgoing radiation of the laser beam for removing the tinction layer of the above-mentioned correction pixel section detected using this defective detection means, The beam-of-light outgoing-radiation means for exposure which carries out the outgoing radiation of the beam of light for exposure for exposing the photosensitive tinction layer prepared in the area containing the correction pixel section from which the tinction layer was removed, A plastic surgery means to operate orthopedically the configuration of the beam of light for exposure by which the outgoing radiation was carried out from the laser beam and the above-mentioned beam-of-light outgoing-radiation means for exposure by which the outgoing radiation was carried out from the above-mentioned laser-beam outgoing-radiation means in the configuration of the above-mentioned pixel section, It is a configuration equipped with a beam-of-light convergence means to complete the beam of light orthopedically operated by this plastic surgery means as the above-mentioned correction pixel section of a light filter.

[0055] Since the beam of light for a laser beam and exposure orthopedically operated by the plastic surgery means by the same configuration as the pixel section is irradiated by the tinction layer which contains the defective part of the correction pixel section, respectively, and the photosensitive tinction layer of the correction pixel section by this, while all the configurations of a part where the tinction layer was removed become an identity, only the above-mentioned photosensitive tinction layer can be exposed. Therefore, while a setup of the thickness of a photosensitive tinction layer becomes easy and the luminous efficacy of formation work improves, the effect that the beam of light for exposure of sufficient quantity of light of the grade which can fully construct a bridge in the coloring agent contained in the photosensitive tinction layer can be irradiated is done so.

[0056] The defective correction equipment of the light filter of invention of a claim 5 is equipped with the expansion optical-system section to which the above-mentioned defective correction means expands the picture image of a light filter in the defective correction equipment of a light filter according to claim 4, and this expansion optical-system section is a configuration which serves as the above-mentioned beam-of-light convergence means.

[0057] Thereby, since parts mark are reducible, the effect that the manufacturing cost of equipment is reducible is done so.

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[Translation done.]

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] In the defective correction technique of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The process which removes the tinction layer of the correction pixel section which a tinction layer takes correction including a defective part by the laser beam orthopedically operated by the configuration of the above-mentioned pixel section, The process which prepares the removed tinction layer and the photosensitive tinction layer of the same hue in the area containing the correction pixel section from which the tinction layer was removed, The process which irradiates the beam of light for exposure orthopedically operated by the configuration of the pixel section from the front-face side of a photosensitive tinction layer to the photosensitive tinction layer of the above-mentioned correction pixel section, and exposes this photosensitive tinction layer, The defective correction technique of the light filter characterized by including the process which develops the photosensitive tinction layer exposed by exposing, and the process which flushes the photosensitive tinction layer which has not been exposed in this development process.

[Claim 2] The above-mentioned photosensitive tinction layer is the defective correction technique of the light filter according to claim 1 characterized by being prepared by applying a photosensitive coloring agent using a roll coater.

[Claim 3] The above-mentioned photosensitive tinction layer is the defective correction technique of the light filter according to claim 1 characterized by being prepared by sticking a photosensitive tinction film.

[Claim 4] In the defective correction equipment of a light filter which corrects the defect of the tinction layer which the above-mentioned pixel section of a light filter equipped with the installed pixel section has The defective detection means for detecting the correction pixel section which picturizes the light filter on the stage in which a light filter is laid, and this stage, and a tinction layer takes correction including a defective part, The laser-beam outgoing-radiation means which carries out the outgoing radiation of the laser beam for removing the tinction layer of the above-mentioned correction pixel section detected using this defective detection means, The beam-of-light outgoing-radiation means for exposure which carries out the outgoing radiation of the beam of light for exposure for exposing the photosensitive tinction layer prepared in the area containing the correction pixel section from which the tinction layer was removed, A plastic surgery means to operate orthopedically the configuration of the beam of light for exposure by which the outgoing radiation was carried out from the laser beam and the above-mentioned beam-of-light outgoing-radiation means for exposure by which the outgoing radiation was carried out from the above-mentioned laser-beam outgoing-radiation means in the configuration of the above-mentioned pixel section, Defective correction equipment of the light filter characterized by having a beam-of-light convergence means to complete the beam of light orthopedically operated by this plastic surgery means as the above-mentioned correction pixel section of a light filter.

[Claim 5] It is the defective correction equipment of the light filter according to claim 4 which the above-mentioned defective detection means is equipped with the expansion optical-system section

which expands the picture image of a light filter, and is characterized by this expansion optical-system section serving as the above-mentioned beam-of-light convergence means.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is sectional drawing showing the outline of the defective correction technique of the light filter of this invention.

[Drawing 2] It is explanatory drawing showing the outline configuration of the defective correction equipment for enforcing technique shown in drawing 1.

[Drawing 3] It is sectional drawing showing the outline of the defective correction technique of the conventional light filter.

[Drawing 4] It is sectional drawing showing the outline of the defective correction technique of other conventional light filters.

[Description of Notations]

1 Light Filter

3 Pixel Section

3a Tinction layer

5 Defective Part

6 Laser Beam

8 Photosensitive Tinction Layer

9 Ultraviolet Rays (Beam of Light for Exposure)

12 Laser-Beam Outgoing-Radiation Section (Laser-Beam Outgoing-Radiation Means)

13 Ultraviolet Line Light Source (Beam-of-Light Outgoing-Radiation Means for Exposure)

14 Defective Detecting Element (Defective Detection Means)

15 Plastic Surgery Section (Plastic Surgery Means)

16 Ultraviolet-Rays Transparency Type Microscope (Ultraviolet-Rays Convergence Means, Expansion Optical-System Section)

18 Stage

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[Translation done.]